

PICTURE OF THE MONTH



(a) Pass 1037/1036, Camera 2, frame 10, 1657 GMT.



(b) Pass 1037/1036, Camera 2, frame 9, 1658 GMT.

These TIROS IV photographs of the eastern Great Lakes Region show some remarkable variations in solar reflectivity over Lake Erie.* The photographs were taken only 30 sec. apart, shortly before local noon on April 21, 1962. Certain portions of the lake shore which are almost invisible are delineated by dotted lines. North is indicated by the arrows.

The surface synoptic analysis for 1800 GMT, April 21, showed a polar anticyclone (1029 mb.) centered over the Carolinas, with a southwesterly return flow over the pictured region, averaging 10 to 20 kt. Thick, mostly middle-level cloudiness, associated with an approaching warm front, had advanced as far eastward as Michigan and Indiana (left portion of (a)), but generally clear skies or thin scattered-to-broken cirrus clouds existed over the immediate vicinity of Lakes Erie and Ontario. Surface air temperatures at nearby stations had risen rapidly into the 50's and low 60's (°F.) after early morning minimums of near freezing.

In (a) much of the brightness of Lake Erie is due to specular reflection which is centered near the southern shore of that lake. A small lake in northern Ohio also appears very bright. Lesser, diffuse reflectivity is visible over Lake St. Clair to the north and even over the southernmost portion of Lake Huron.

In (b), taken 30 sec. later, the proper angular relationship between satellite and sun no longer existed, and the intense specular reflection from Lake Erie is not present. However, some peculiar brightness differences which also exist in (a) are still noticeable in (b). Any

or all of the conditions set forth in the following three hypotheses may have contributed to these brightness variations. (1) is believed probable; (2) and (3) are thought to be less likely possibilities:

(1) In (b) the lighter gray areas of Lake Erie may represent patches of semi-transparent cirrus clouds. These are not as noticeable in (a) because of the co-existing specular reflection;

(2) Over the eastern half of Lake Erie, the lighter gray areas may represent diffuse reflection from wind-roughened water, with the dark, rather sharp-edged areas near the southeastern shore corresponding to areas of essentially no reflection from smooth water. The latter might co-exist with great thermal stability in the lowest atmospheric layer. Aided by underlying cold water, these areas of stability (if they existed) had persisted from early morning and had not yet been wiped out by insolation and vertical mixing. Such stability would inhibit surface wind stress and thus would favor a smooth water surface having no diffuse reflection;

(3) Organic or inorganic pollutants (e.g., oil slicks) may have altered the reflective properties of certain portions of the lake.

Two small bright spots near the southern end of Georgian Bay (east of Lake Huron) and at the extreme eastern end of Lake Erie, respectively, are visible in both photographs. These represent remaining patches of ice.

*Also, see "Picture of the Month," October 1964, p. 474.